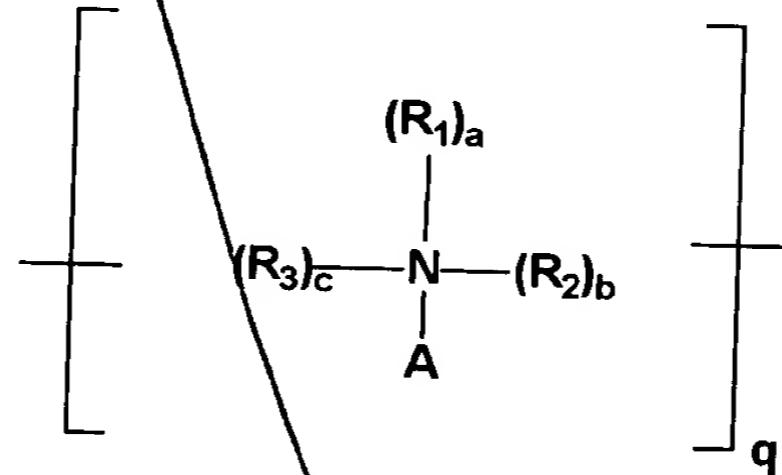


WHAT IS CLAIMED IS:

1. A composition for use in synthesizing a nucleic acid molecule, comprising one or more compounds having a chemical formula selected from the group consisting of formula I or formula II, or a salt or derivative thereof:

Formula I:



wherein A is $(R_4)_d - CR_5 - X$

wherein X is $(Z)_f$
 $(CR_6)_m - (Y)_e$;

wherein $q = 1$ to 100,000, wherein when $q = 2$ to 100,000 each monomer of formula I may be the same as or different from the other monomers of formula I;

wherein Z may be the same as or different from Y;

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wherein each Y and Z are independently selected from the group consisting of -OH, -NH₂, -SH, -PO₃H, -CO₂H, -SO₃H and hydrogen;

wherein f is an integer from 0 to 2, m is an integer from 0 to 20 and e is an integer from 0 to 2;

wherein R₄, R₅, and R₆ may be the same or different and are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, amino, mercaptan, thiol, halo, nitro, nitrilo, hydroxy, hydroxyalkyl, hydroxyaryl, phosphato, alkoxy, oxide, ether, ester (alkanoyloxy), carboxy, carbonyl, sulfonyl, sulfonic and amido groups, and d is an integer from 0 to 2;

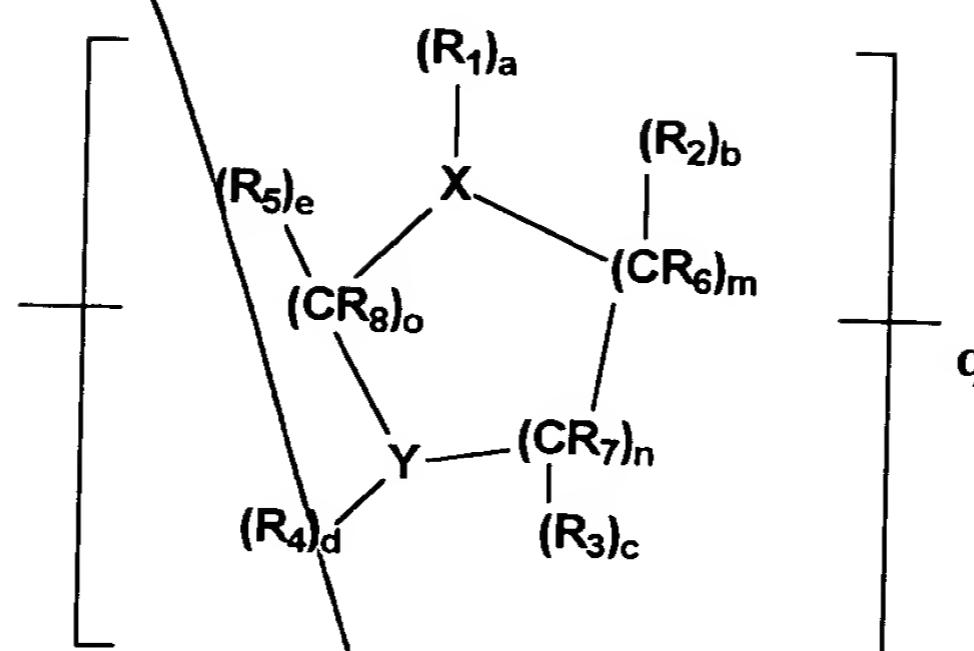
wherein a, b, and c are independently an integer from 0 to 1, with the proviso that no more than two of a, b, and c are zero;

wherein R₁, R₂ and R₃ may be the same or different and are independently selected from the group consisting of:

- a) =O;
- b) (W)_g
 - |
 - (CR₇)_n;

wherein each R₇ and W may be the same or different and are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, amino, thiol, mercaptan, halo, nitro, nitrilo, hydroxy, hydroxyalkyl, hydroxyaryl, phosphato, alkoxy, oxide, ether, ester (alkanoyloxy), carboxy, carbonyl, sulfonyl, sulfonic and amido groups; g is an integer from 0 to 2 and n is an integer from 0 to 20;

Formula II:



wherein Formula II is saturated or unsaturated;

wherein $q = 1$ to $100,000$, wherein when $q = 2$ to $100,000$, each monomer of formula II may be the same as or different from each other monomer of formula II;

wherein X is selected from the group consisting of N, C, O, P and S;

wherein Y is selected from the group consisting of O, N, S, P, C, -O-NH-, -O-CH₂-NH-, -O-CH₂-O-, -NH-CH₂-NH-, -O-CH(CH₃)-NH-, -NH-CH(CH₃)-NH-, -O-CH(CH₃)-O-, -NH-C(CH₃)₂-NH-, -O-S-, -O-CH₂-S-, -NH-S-, -NH-CH₂-S-, and other mercaptan, phosphato, alkoxy, oxide, ether, esters (alkanoyloxy), carboxy, sulfonyl, sulfonic and amido groups;

wherein R_1 , R_2 , R_3 , R_4 , R_5 , R_6 , R_7 and R_8 may be the same or different and are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, amino, thiol, mercaptan, halo, nitro, nitrilo, hydroxy,

hydroxyalkyl, hydroxyaryl, phosphato, alkoxy, oxide, ether, ester (alkanoyloxy), carboxy, sulfonyl, sulfonic and amido groups; and

wherein a, b, c, d, e, m, n, and o are integers which may be the same or different and are independently selected from 0 to 2 for a, b, c, d, and e, and 0 to 5 for m, n, and o.

2. The composition of claim 1, with the proviso that when q = 1 and one of $(R_1)_a$, $(R_2)_b$, and $(R_3)_c$ is oxygen and the other two are the same or different and are independently selected from the group consisting of hydrogen, methyl, ethyl and propyl, then A is not methyl, ethyl, or propyl.
3. The composition of claim 1, wherein when a, b, or c is zero, the corresponding R group is a pair of electrons.
4. The composition of claim 1, wherein Y and/or X are N and m, n and o are 1.
5. The composition of claim 1, wherein, Y and/or X are N and/or O, and m and n are 1, and o is 2.
6. The composition of claim 1, wherein said composition comprises at least two compounds having the formula I or II, or salts or derivatives thereof.
7. The composition of claim 6, wherein said composition comprises 2 to 5 compounds having the formula I or II, or salts or derivatives thereof.
8. The composition of claim 6, wherein said composition comprises proline or a derivative thereof.

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9. The composition of claim 6, wherein said composition comprises an N-alkylimidazole compound.

10. The composition of claim 9, wherein said N-alkylimidazole compound is 1-methylimidazole or 4-methylimidazole.

11. The composition of claim 1, wherein said compound is selected from the group consisting of 4-methylmorpholine N-oxide, betaine, carnitine, ectoine, poly(2-ethyl-2-oxazoline) of average molecular weight about 50,000 to about 500,000 daltons, and poly(diallyldimethylammonium chloride) of average molecular weight about 100,000 to about 200,000 daltons.

12. The composition of claim 6, wherein said compound is selected from the group consisting of 4-methylmorpholine N-oxide, betaine, carnitine, ectoine, poly(2-ethyl-2-oxazoline) of average molecular weight about 50,000 to about 500,000 daltons, and poly(diallyldimethylammonium chloride) of average molecular weight about 100,000 to about 200,000 daltons.

13. The composition of claim 1, further comprising one or more enzymes having nucleic acid polymerase activity.

14. The composition of claim 6, further comprising one or more enzymes having nucleic acid polymerase activity.

15. The composition of claim 13, wherein said enzyme having nucleic acid polymerase activity is selected from the group consisting of a DNA polymerase, an RNA polymerase and a reverse transcriptase.

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16. The composition of claim 14, wherein said enzyme having nucleic acid polymerase activity is selected from the group consisting of a DNA polymerase, an RNA polymerase and a reverse transcriptase.

17. The composition of claim 15, wherein said DNA polymerase is selected from the group consisting of *Taq*, *Tne*, *Tma*, *Pfu*, VENT™, DEEPVENT™ and *Tth* DNA polymerases, and mutants, variants and derivatives thereof.

18. The composition of claim 15, wherein said reverse transcriptase is selected from the group consisting of M-MLV reverse transcriptase, RSV reverse transcriptase, AMV reverse transcriptase, RAV reverse transcriptase, MAV reverse transcriptase and HIV reverse transcriptase, and mutants, variants and derivatives thereof.

19. The composition of claim 15, wherein said reverse transcriptase is substantially reduced in RNase H activity.

20. A composition for use in synthesizing a nucleic acid molecule comprising one or more components selected from the group consisting of one or more amino acids, one or more saccharides, one or more polyalcohols, or derivatives thereof, or combinations thereof.

21. A composition obtained by combining two or more compounds or components of any one of claims 1 or 20.

22. A method for synthesizing a nucleic acid molecule, comprising:
(a) mixing a nucleic acid template with one or more of the compositions of claim 1 or 20 to form a mixture; and

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(b) incubating said mixture under conditions sufficient to make a first nucleic acid molecule complementary to all or a portion of said template.

23. The method of claim 22, further comprising incubating said first nucleic acid molecule under conditions sufficient to make a second nucleic acid molecule complementary to all or a portion of said first nucleic acid molecule.

24. A nucleic acid molecule made according to the method of claim 22.

25. A method for amplifying a nucleic acid molecule comprising:

(a) mixing a nucleic acid template with one or more of the compositions of claims 1 or 20 to form a mixture; and

(b) incubating said mixture under conditions sufficient to amplify a nucleic acid molecule complementary to all or a portion of said template.

26. A method for sequencing a nucleic acid molecule comprising:

(a) mixing a nucleic acid molecule to be sequenced with one or more primers, one or more of the compositions of claims 1 or 20, one or more nucleotides and one or more terminating agents to form a mixture;

(b) incubating said mixture under conditions sufficient to synthesize a population of molecules complementary to all or a portion of said molecule to be sequenced; and

(c) separating said population to determine the nucleotide sequence of all or a portion of said molecule to be sequenced.

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27. A kit for use in synthesis of a nucleic acid molecule, said kit comprising one or more of the compounds or components of claims 1 or 20.

28. The kit of claim 27, wherein said kit comprises at least two of said compounds or components.

29. The kit of claim 27, further comprising one or more components selected from the group consisting of one or more nucleotides, one or more DNA polymerases, one or more reverse transcriptases, one or more suitable buffers, one or more primers and one or more terminating agents.

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